UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
EUGENE DISTRICT OFFICE

ENVIRONMENTAL ASSESSMENT NO. EA-02-15
Travis Tyrrell Seed Orchard Insect Control

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I. INTRODUCTION

A. BACKGROUND

This action proposes application of insecticide in the spring of 2003 within the fenced boundaries of Travis Tyrrell Seed Orchard on orchard units located in Section 15, Township 20 South, Range 5 West, Willamette Meridian, Lane County, Oregon, in the Eugene District of the Bureau of Land Management (BLM). The 832.5-acre orchard is located about 3 miles west of Lorane, Oregon in the upper Siuslaw River basin (Figure 1). The seed orchard is managed on lands that are closed to all public use per Public Land Order (PLO) 6662.

The Tyrrell Seed Orchard, hereafter referenced as the Orchard, was established in 1983 as a centralized tree seed orchard designed to provide improved Douglas-fir seed for BLM's Coos Bay, Roseburg and Eugene Districts. The seed produced is genetically diverse and is well adapted for reforesting sites in western Oregon. In 1998, a cooperative agreement was initiated with ten private timber and seed companies. This has allowed the BLM to more cost effectively manage the Orchard and make the existing genetic resources available to others. The cooperators share in the annual expenses of all 24 Douglas-fir seed production orchards and are part of a management committee for each of these units. These units range in age from eight to fifteen years and have measurable cone production beginning at about age nine. Since the oldest orchard units have just started to produce cone crops in the past several years, the demand for seed from the Orchard is very high.

B. PURPOSE AND NEED FOR THE ACTION

The purpose of the action is to control cone insects which cause damage and seed loss to Orchard cone crops. There is a need for control of cone insects in two seed production units (Figures 2 , 3 and 4) in which a cone crop is expected in 2003. A total of 29 acres were stimulated for cone production in Swisshome/Mapleton and Noti seed production units in spring 2002 using overlapping, half-circumference girdles, followed with an application of calcium nitrate fertilizer. This method is commonly used in seed orchards and is projected to stimulate a cone crop of about 2,500 bushels in late summer 2003.

Manual treatments to reduce insect damage have been done the past three years. This has included removal of all visible cones during cone harvest in August and removal of conelets in younger orchards in May. This manual effort, referred to as sanitation, helps remove insects and insect habitat from the orchard trees. While the results of this control method have been hard to quantify, sanitation will continue to be practiced on all seed production units until a comprehensive integrated pest management program is in place. In spite of this effort, seed extraction completed in 1999, 2000, and 2001 showed a considerable reduction in yield due to insect problems. Damage is anticipated to persist at current levels or become worse. An intensive cone dissection study was conducted in September 2000 and 2001 under the direction of Beth Willhite, U.S. Forest Service entomologist for the Westside Forest Insect and Disease Center. Her preliminary reports indicate that the Douglas-fir cone gall midge (*Contarinia oregonensis*), the Douglas-fir seed chalcid (*Megastigmas spermotrophus*), and Douglas-fir coneworm (*Dioryctria abietivorella*) caused notable damage to the 2000 and 2001 seed crops at Tyrrell. Projected loss from insect-related damage was approximately 196 pounds of seed from the 1,089 bushels collected in 2000 (about $196,000 in lost value). The

level of insect damage in 2000 was at least 34%; it was at least 25% in 2001. A large, natural cone crop developed in 2002, which typically results in high insect damage the following year. It is conceivable that damage could be as high as 40% in 2003.

The BLM has a projected seed need from the Orchard of approximately 425 pounds of improved Douglas-fir seed per year. In addition, the cooperators are participating in and financing 56.09 acres of seed orchard management, with their anticipated yield being 280 pounds of improved Douglas-fir seed per year. The anticipated yield for the cooperators corresponds to approximately 7,750 acres of industrial land which can be reforested with this seed each year. Protecting cone crops from insect damage is necessary to achieve this goal.

C. CONFORMANCE WITH LAND USE PLAN

The Proposed Action and alternatives are in conformance with the Eugene District Record of Decision and Resource Management Plan (RMP)(USDI Bureau of Land Management 1995), which states that seed orchards will be maintained and managed to produce seed as needed for ecosystem management projects (RMP, p. 263). It also addresses the need to plant improved stock on most of the harvested acres on the District requiring reforestation (RMP, pp. 262-263). Beyond this direction in the Forest Genetics Program appendix and the provisions in the Resource Program sections for Energy and Mineral, Land Tenure Adjustments, Rights-of-Way, Access and Withdrawals, the RMP does not apply to the Orchard, which has been administratively withdrawn (RMP, p. 100).

The Proposed Action and alternatives are also in conformance with the Lorane Seed Orchard Development Project (EA-OR090-3-35)(USDI Bureau of Land Management. 1983), which directs the development and management of the Orchard and states that insecticides may be applied during the cone production stages (Lorane Seed Orchard Development Project EA, p. 12).

D. RELATIONSHIP TO OTHER PLANS AND ENVIRONMENTAL ANALYSES

An Environmental Impact Statement (EIS) is currently being written to address Integrated Pest Management (IPM) practices for the four BLM seed orchards located in western Oregon. However, the earliest this document is expected to be completed is the end of 2003, making it necessary to address the immediate issue of cone insect control for the spring of 2003 in this separate analysis.

The Orchard is an administratively withdrawn area and does not fall under the standards and guidelines of the Northwest Forest Plan (RMP, p. 100).

Additional information is available in the Travis Tyrrell Seed Orchard Insect Control project analysis file. This file and documents referenced above are available for review at the Orchard.

II. ISSUES

A. ISSUES SELECTED FOR ANALYSIS

The following issues were identified during development of the action alternatives:

Issue 1: *How does this insecticide affect non-target species including pollinators and insect predators?*

Issue 2: *How will this insecticide application affect Coho salmon and other aquatic species?*

Issue 3: *How will this insecticide application affect northern spotted owl foraging and dispersal habitat?*

Issue 4: *What is the potential impact of insecticide application on worker safety?*

B. ISSUES NOT ANALYZED

The impacts of the Proposed Action on the marbled murrelet were considered, but not analyzed because (1) tracking stations placed to the north of the Orchard in potential habitat detected no murrelets, and (2) potential habitat for murrelets was not found within the fenced perimeter of the Orchard.

The impacts of the Proposed Action and alternatives on drinking water were considered, but not analyzed because scoping revealed that there are no private domestic water sources adjacent to the treatment area.

III. ALTERNATIVES

A. PROPOSED ACTION: Application of Esfenvalerate Insecticide by Aerial (Helicopter) Equipment.

Twenty-nine acres in two seed production units would be treated in 2003 with esfenvalerate (Figures 2, 3 and 4). A minimum buffer width between the treatment areas and flowing water would be 200 feet. Spray detection cards would be used in areas adjacent to treatment units for application drift. Following application, the drift cards would be reviewed to determine if drift had occurred, the extent of the drift, and the potential for contamination of the adjacent waterbodies. Due to the short duration for aerial spray activities, drift cards could not be checked until the application is completed; therefore, they would not be used to modify operational tactics.

A spray helicopter equipped with a pesticide tank for application of liquid mixtures would be utilized, treating all trees within the treatment boundaries (approximately 2333 trees). Most of the trees planned for treatment are under 40 feet in height. Table 1 shows the rate of esfenvalerate (trade name ASANA XL®) application proposed for both of the seed production orchards (DuPont Agricultural Products 2000a).

Table 1: Rate of Esfenvalerate Proposed for 2003 Treatment (Proposed Action)

Orchard Unit	Potential Cone Bearing Trees	Treatment Acres	Esfenvalerate (Asana XL®)	
			Proposed Application Rate per Acre (lb. of a.i.)	Maximum Label Application Rate per Acre (lb. of a.i./acre)
Swisshome/Mapleton	1385	17	0.190	0.190
Noti	948	12	0.190	0.190
Total	2333	29		

* a.i. = active ingredient

A single spray application would take place in April to early May, depending on time of insect emergence and weather conditions, to suppress the cone gall midge, seed chalcid, and cone worm. Insecticide application would occur when wind, temperature and humidity are optimum for minimizing drift. Spraying would be limited to periods when wind speeds are less than or equal to 6 mph and relative humidity is greater than 50 percent. Application would not occur during periods of wind turbulence, when precipitation or fog is occurring or is imminent, during inversions, or when foliage is carrying snow or ice (USDI Bureau of Land Management 1988).

Flight patterns would occur parallel to streams and buffer areas when operationally feasible, but would not cross any stream channels. Flight patterns would not cross water bodies (ponds, steams, live water). All trees within the treatment areas are at least 30 feet from Orchard fence lines and neighboring properties. Total time for treatment application would likely be less than one hour.

Two separate mixing areas (one for each unit) would be utilized to ensure that the helicopter would not fly insecticide over live water (Figure 5). Areas used for mixing insecticide would be located at least 200 feet from streams with water. A spill kit, filled with absorbent materials, would be located near the mixing area in the event of an accidental spill.

B. ALTERNATIVE A: Application of Esfenvalerate Insecticide by use of Ground-Based Equipment

Twenty-nine acres in two seed production units would be treated in 2003 with esfenvalerate. The treatment boundaries would be the same as in the Proposed Action (Figures 2, 3 and 4). A minimum buffer width between the treatment areas and perennial streams would be 200 feet. Spray detection cards would be used to monitor areas adjacent to treatment units for application drift. Following application, the drift cards would be reviewed to determine if drift had occurred, the extent of the drift, and the potential for contamination of the adjacent waterbodies. Because spray operations would be conducted over a much longer period of time than if completed aerially, the cards could be monitored concurrently with spraying, allowing for operational tactics to be modified if drift were detected.

Truck-mounted or tractor-fitted hydraulic sprayers with hand-held trigger nozzles on hoses would be utilized. Although there are approximately 2333 stimulated trees within the treatment boundaries, only those trees bearing cones would be sprayed. Treatment of about 1633 trees is more likely, given an historical stimulation success of between 60% and 70% of

total trees stimulated. This is in contrast to the Proposed Action, where all trees within the treatment area would be sprayed. Most of the trees would be under 40 feet in height. Table 2 shows the rate of esfenvalerate (trade name ASANA XL®) application proposed for both of the seed production orchards (DuPont Agricultural Products 2000a).

Table 2: Rate of Esfenvalerate Proposed for 2003 Treatment (Alternative A)

Orchard Unit	Potential Cone Bearing Trees	Probable Cone Bearing Trees	Treatment Acres	Esfenvalerate (Asana XL®)		
				Application Rate per Tree (lb. of a.i.*)	Application Rate per Acre (lb. of a.i./acre)	Max. Label Application Rate per Acre per Year (lb. of a.i./acre)
Swisshome /Mapleton	1385	969	17	0.001	0.057	1.6
Noti	948	664	12	0.001	0.055	1.6
Total	2333	1633	29			

* a.i. = active ingredient

All trees within the treatment areas are at least 30 feet from Orchard fence lines and neighboring properties. Total time of application would be approximately 27 hours (1633 trees/60trees per hour), extending the application period over a 6 to 8 day period considering a 3-4 hour spray window per day. When spraying near the edge of seed production orchards, the nozzle would be directed towards the center of the treatment unit to minimize the chance for drift. All other operational guidelines discussed in the Proposed Action would be followed.

C. ALTERNATIVE B: No Action

The Orchard would not perform pesticide application to control cone insects. Manual pest management techniques such as clean picking cones at harvest time and removing conelets from unstimulated orchards would continue. Success or failure of seed crops would be regulated by natural conditions, with expected seed yields being smaller in quantity and lower in quality than if pesticides were utilized. All other activities related to seed orchard management would continue as usual.

D. ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

The use of high volume, tractor-pulled vacuums was considered but dropped from further analysis. This tool "rakes", vacuums, and collects organic debris at the soil surface layer, removing the litter layer and disturbing the duff layer. This application is typically done in the fall and potentially captures insects which overwinter at the ground layer. Prototype vacuums are currently being tested at seed orchards in the Pacific Northwest, but further design modifications will delay operational use of the technology for several more years.

Pheromone kill traps, currently being analyzed by Simon Frazer University (SFU) in British Columbia, Canada for control of the Douglas-fir cone gall midge, were also considered but not analyzed in detail. Although this method shows potential, adaptive research has not yet progressed to a point where it is an operational treatment (Bennett 2000). The Orchard worked directly with SFU in 2000 and 2001, providing field testing locations for their

pheromone research.

E. MITIGATION MEASURES FOR ALL ACTION ALTERNATIVES

1. Human Health

- A job hazard analysis (JHA) would be developed to provide a detailed description of orchard jobs and associated risks involved with pesticide use and application. It would identify requirements for personal safety equipment, training, and certification to perform specific tasks.
- A Worker Protection Standard for the use of esfenvalerate would be developed to identify project specific safety procedures.
- Minimum mitigation would follow guidelines shown on the pesticide label. These guidelines, required by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), show allowable uses, application rates, and special restrictions for each pesticide.
- Material Safety Data Sheets would be posted at storage facilities and made available to workers (DuPont Agricultural Products 2000b). These provide physical and chemical data, fire and reactivity data, specific health hazard information, spill or leak procedures, instructions for worker hygiene, and special precautions.
- Asana XL® would be handled and applied by individuals certified in the use of restricted-use pesticides or under the direct supervision of certified applicators.
- Treated areas would not be entered until the spray had dried unless all the necessary personal protective equipment (PPE) required on the label is worn. Warning signs would be posted to prevent accidental entry into treated areas.
- Appropriate protective clothing would be worn by all workers. At a minimum, the type and amount of protective clothing listed on the pesticide label would be used (Table 3).

Table 3: Minimum Protective Clothing Requirements for Use of Proposed Pesticides.

Pesticide	Label Instructions for Protective Clothing
Esfenvalerate	Long-sleeved shirt, chemical-resistant gloves, shoes and socks and protective eyewear.

- Workers who know they are hypersensitive to pesticides would not be assigned to application projects. Workers who display symptoms of hypersensitivity to pesticides during application would be reassigned to other duties.

2. Natural Resources

- Adjacent landowners within 1/4 mile of treatment areas would be notified prior to pesticide application.
- Precautions would be taken to assure that equipment used for transport, mixing, and application would not leak pesticides into water or soil. Areas used for mixing insecticide would be located at least 200 feet from streams with water. A spill kit, filled with absorbent materials, would be located near the mixing area in the event of an

accidental spill.

- A minimum buffer width between the treatment areas and perennial streams would be 200 feet.
- Applications would be timed so as not to coincide with or closely precede large storm events that could result in substantial runoff. If rain precedes the intended application window, orchards would be checked for infiltration rate prior to application.
- Application would not occur if soils are saturated. Saturation levels would be determined by a soil scientist.
- Water quality monitoring would occur before and after application.
- Spray detection cards would be placed 35, 50 and 100 feet from the edge of the treatment units along riparian buffers. This would include the east boundary of the Swisshome/Mapleton, west boundary of the Noti, and the southwest corner of the Noti along stream 54. They would be spaced 100 to 200 ft. apart. They would be stapled at a 45° angle to wooden lathe, with the cards facing the treatment area. Additionally, a few cards would be strategically placed next to stream 8 (both sides). Following application, the drift cards would be reviewed to determine if drift had occurred, the extent of the drift, and the potential for contamination of the adjacent waterbodies.
- Silt fence catchment barriers would be installed in swales located adjacent to or inside treatment units. The function of these barriers would be to catch organics, sediment, and adsorbed insecticide leaving the treatment area.
- Soil aeration would be done along unit boundaries downslope from treatment units and above catchment barriers. This would increase infiltration, reduce overland flow, and maximize binding of insecticide by soils.
- Application unit boundaries would be clearly marked with highly visible traffic cones or flagging in a manner that would allow visual identification from the air or ground.
- Smoke flares would be deployed in each orchard prior to application to provide for pilot/applicator recognition of wind speed and direction.
- If monitoring by botanists or wildlife biologists indicate that Orchard fields contain a significant herbaceous flowering component prior to insecticide application, they would be mowed to help minimize the presence and exposure of pollinators, such as bees, to the insecticide. This action would allow greater flexibility and minimize the necessity of operating when temperatures are less than 52°F, when insects are not active or are less active.
- Bird boxes in the proposed spray areas would be removed prior to March 1, 2003.
- Nozzles would be directed away from the fence lines and riparian areas during ground application to aid in reducing drift.
- Flight patterns would occur parallel to streams and buffer areas when operationally feasible. Flight patterns would not cross water bodies (ponds, steams, live water).
- Spray would be released during aerial application at the lowest height consistent with

pest control and flight safety.

- Areas immediately adjacent to buffers would be treated prior to the rest of a unit during aerial application. The helicopter would operate around the buffer areas with the boom closest to the sensitive area turned off to provide maximum spray control.

3. Regulatory Procedures

- All applicable local, state and Federal laws, including the pesticide labeling instruction of the Environmental Protection Agency, would be strictly followed.
- Pesticides would be applied within the prescribed environmental conditions stated on the label or within Government guidelines, whichever is more stringent. This would include consideration of relative humidity, wind speed, and air temperature when determining the timing of application relative to drift reduction.

4. Training

- Pesticide applicator licensing and training would be used as a quality control measure. Training and testing of applicators covers laws and safety, protection of the environment, pesticide handling and disposal, pesticide formulations and application methods, calibration of devices, use of labels and data sheets, first aid, symptoms of pesticide exposure, and other activities (Oregon State University Extension Service 1997).

IV. AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

The following resources either are not present or would not be affected by the Proposed Action or any of the alternatives: air quality, areas of critical environmental concern, cultural resources, prime or unique farmlands, Native American religious concerns, Wild and Scenic Rivers, wilderness, minority populations and low income populations.

A. SOCIAL AND ECONOMIC ENVIRONMENT

1. Community Information

The Orchard is located in rural Lane County, about three miles west of Lorane, Oregon. The population of Lorane is about 300. Property in the vicinity of the Orchard is a mix of rural residential, farmland, vineyards, and forests. The majority of the area within 1/4 mile of the Orchard boundary is private timber land or federal land, with only four residential, non-industrial private land owners on the southerly boundary.

Lane County has a population of close to 315,000 on a land base of 4,620 square miles. Stretching from the Pacific Ocean to the crest of the Cascade Mountain range, about fifty percent of the county is under federal or state ownership. The Eugene/Springfield area, which has a population of about 182,000 people, is the only large urban area in the county. The remaining population base is spread out in small communities throughout the Willamette Valley and along major drainages (Lane County Government Online 2000).

The Orchard currently employs five permanent full-time and two term-seasonal employees, all of whom have their duty station at the Orchard. In addition, the Orchard utilizes private contractors for labor-intensive operational work.

2. Economic Information

The Orchard has an annual maintenance and support budget of about $370,000. About one-third of this is made up by contributions from the private cooperators. Approximately $9950 was spent in 2001 on conelet removal and sanitation collections for insect control. Based on figures submitted by spray contractors for similar sized jobs, aerial application would cost approximately $1500 - $1800, while ground application would cost about $7900. The use of pesticides for protection of cone crops has not been utilized to date.

3. Residences

The administrative site at the Orchard is comprised of an office, warehouse/shop, cone storage building, and seed lab/kiln. There are no residences on the Orchard grounds. There are approximately three private residences and one cabin rental complex within one-quarter mile of the fenced Orchard boundary, all of which are located on Siuslaw River Road. Only one of these residences is within one-quarter mile of the proposed treatment areas. Residential water sources are derived from either wells or springs, none of which are located on federal lands.

Impacts of the Alternatives on Social and Economic Conditions

a. **Proposed Action and Alternative A**: Although these alternatives would not have a substantial impact on the Lorane or Lane County area, they would have a positive impact upon the economic conditions at the Orchard. Protecting the Orchard cone crop would reduce the probable loss of valuable tree seed to insects and would enable the BLM and cooperators to protect their investment and to reforest their lands with improved conifer seedlings.

b. **Alternative B (No Action):** This alternative would have a substantial impact on the economic setting at the Orchard, but have little impact on the local community. Success or failure of seed crops would be regulated mainly by natural conditions. Moderate to high insect infestations would reduce harvestable seed crops and make them extremely expensive to harvest due to low quantities of viable seed. The seed that is recovered would likely be of much smaller quantity and lower quality than that expected following the use of pesticides. The ability to attain the desired yearly seed yields for BLM and cooperator use would be doubtful.

B. RECREATION

A forest succession trail lies outside the Orchard boundaries. It begins at the office compound and follows a northeasterly direction into the southern portion of Section 15. The trail, which shows the stages of forest stand dynamics, is open to the public during business hours and is used by school groups, social organizations, and industrial tour groups. Because the trail is located at least 400 feet from any of the potential treatment areas, recreational use of the trail would not be impacted by the Proposed Action or any of the alternatives.

C. HUMAN HEALTH

The use of chemical pesticides always poses some degree of risk, with the potential increasing for workers involved with the handling, mixing, spraying, and cleaning of application equipment. Access to the seed production orchards is controlled by a series of

locked gates, which limit the chances for directly exposing the public to insecticides. The risk of an insecticide application causing negative consequences to the human health of Orchard workers and/or the general public, as described in the Proposed Action and Alternative A, is expected to be negligible.

Impacts of the Alternatives on Human Health

1. **Proposed Action (Aerial Application of Esfenvalerate):** Esfenvalerate (trade name: Asana XL®) is a restricted use synthetic pyrethroid insecticide registered for use on non-crop land (excluding public land such as forests, parks, or recreational), conifer seed orchards and forest tree nurseries. It kills cone insects by contact or ingestion, affecting the function of the nervous system.

   Esfenvalerate is not classified as an agent which causes cancer, genetic damage, or birth defects, or as an agent which affects fertility, reproduction, or the development of offspring; however, it is a nervous system poison. Overexposure of the skin to this pesticide can cause burning or prickling that may persist for up to 24 hours and may be accompanied by a rash or visible skin irritation. Other symptoms of acute toxicity (poisoning) such as discomfort and tearing or blurring of vision can occur if esfenvalerate gets into the eyes. Ingestion results in dizziness, headaches, nausea, vomiting, anorexia and fatigue. More serious outcomes include convulsions and coma. Persons with preexisting diseases of the liver, kidneys, skin, or peripheral nervous system may be more susceptible to excessive exposures.

   Chronic toxicity, which occurs as a result of small, repeated doses of pesticide over a long period of time, has not been reported with esfenvalerate. Workers chronically exposed to fenvalerate, a closely related pesticide which contains esfenvalerate, showed symptoms ranging from mild itch to a stinging sensation that becomes numbness in severe cases. Asana XL® formulation is toxic, and may be fatal if swallowed (Oregon State University 1996).

   The contents of Asana XL® are: esfenvalerate (8.4%) and inert ingredients (91.6%). EPA's strategy for addressing concerns related to the "inert" ingredients includes a ranked list based on their level of toxicity. Inerts of toxicological concern were placed on List 1. Potentially toxic inerts/high priority for testing were placed on List 2. Inerts of unknown toxicity were placed on List 3 and inerts of minimal concern were placed on List 4. Two inerts contained in the Asana XL® formulation, ethylbenzene (< 1%) and xylenes (<3%) (o, m, and p- isomers),were classified as List 2 compounds. The remaining portion of the formulation is proprietary information and is, therefore, unknown.

   Ethylbenzene is a colorless liquid with an aromatic odor, that occurs naturally in coal tar and petroleum. Gasoline contains about 2% (by weight) ethylbenzene (Agency for Toxic Substances and Disease Registry 1996b). Acute health affects include irritation to the eyes, skin, nose and throat. Exposure to high concentrations can cause dizziness and lightheadedness and may affect the liver. Very high levels can cause breathing problems and even death. Ethylbenzene can cause mutations (genetic changes). Further study is needed to determine if it poses a cancer or reproductive hazard (New Jersey Department of Health and Senior Services 1996).

   Xylene is a colorless, sweet-smelling liquid that occurs naturally in petroleum and coal tar

and is formed during forest fires (Agency for Toxic Substances and Disease Registry 1996a). Xylene affects the central nervous system, and in high levels can cause headaches, lack of muscle coordination, dizziness, confusion and changes in balance. Short periods of exposure can also cause difficulty in breathing, eye irritation, delayed reaction time, lung problems, memory difficulties, stomach discomfort, and possibly changes in the liver and kidneys. Unconsciousness and even death can occur at very high levels, especially if swallowed. Xylene is not classified as to its carcinogenicity in humans. It is unknown if an unborn child is harmed if the mother is exposed to low levels of xylene during pregnancy (Mallinckrodt Baker, Inc. 2002).

When used according to the manufacturer's directions, Asana XL® is expected to have exposures to inert ingredients that would be much less than the levels at which serious health effects have been observed.

In 2001, the Eugene District contracted Labat-Anderson Incorporated to analyze risks to human health and non-target species from using pesticides and fertilizers at the Seed Orchard. This was published as Risk Assessment of Pesticides and Fertilizers Proposed for use at Travis Tyrrell Seed Orchard (USDI Bureau of Land Management 2002). This document is available in the Project Analysis File and is hereby referred to as the "Risk Assessment".

This quantitative Risk Assessment estimated the risks to members of the public and workers as a result of using pesticides in the Orchard. A hazard index, representing the ratio of the estimated dose to the reference dose, was developed to indicate risk (a hazard index of 1 or less usually indicates negligible risk to human health). Analysis showed the hazard indices for the use of esfenvalerate when applied aerially to be 0.0570 (helicopter mixer/loader) and 0.0481 (helicopter pilot), indicating a negligible risk of noncarcinogenic human health effects to workers applying the insecticide (USDI Bureau of Land Management 2002).

2. **Alternative A (Esfenvalerate Application using Ground-Based Equipment):** The Risk Assessment showed the hazard indices for the use of esfenvalerate with high-pressure hydraulic sprayers to be 0.000243, indicating a negligible risk of noncarcinogenic human health effects to workers applying the insecticide.

   All other background information pertaining to Esfenvalerate would be the same as described in the Proposed Action.

3. **Alternative B (No Action):** Alternative B would have no effect on human health.

D. THE PHYSICAL ENVIRONMENT

1. Soils

a. General Soils Information - Soil is a three phased system - solid, liquid, and gas. When managing soils for seed orchards the important properties are texture, structure, organic matter content, cation exchange capacity, and pH.

Sand, silt, and clay refer to the size of the mineral particles that make up the soil; sand particles are the largest and clay the smallest. Varying amounts of sand, silt, and clay in the soil determine the soil texture. Fine textured soils, such as those found at the Orchard, have low infiltration capacities so surface runoff is relatively high compared to

percolation. In these soils the potential for pesticide surface loss is high and the potential for leaching is low.

Organic matter consists of a combination of plant, animal, and microbial residues in various stages of decomposition, and live organisms. The amount of organic matter in a soil determines its potential for pesticide adsorption. Soils high in organic matter have reduced potential for surface loss, increased infiltration, reduced runoff and erosion, and low leaching potential. Pesticides are more likely to be adsorbed by soil minerals in such conditions.

Soil micro and macro organisms are also a principal means by which pesticides are broken down into less toxic substances in the soil.

b. Soils at the Orchard - Soils at the Orchard were formed from the more easily weathered siltstone and fine sandstone sequence of the Flournoy/Tyee Formation. Table 4 provides a brief description of the soils identified within the two Orchard units where treatment is proposed. Bellpine is the dominant upland soil throughout the Orchard; it occurs throughout all of the Swisshome/Mapleton Unit and over 50 % of the Noti Unit. Dupee occurs in the swale within the Noti Unit. Erodability ratings are found in Table 5. A soils map is in the project analysis file.

Table 4: Soils Information for Tyrrell Seed Orchard

Soil Series	Bellpine Silty Clay Loam	Dupee Silt Loam
Units Located	Swisshome and Noti	Noti (swale)
Depth	20-40 inches	40-60 inches
Slope	3-20%	3-20%
Depth of Surface Horizon (inches)	13 inches	12 inches
Permeability	Slow	Moderately Slow
Texture	Silty Clay Loam	Silt Loam
Depth to Water Table	> 6 Feet	2-3 Feet (Dec. to March)
Runoff	Slow to Medium	Medium to Rapid
Hazard of Erosion (see Table A-2)	Slight to Moderate	Moderate to High
Hydrologic Soil Group*	C	C

* Group C denotes soils with a slow infiltration rate when thoroughly wet. These soils either have a layer that impedes downward movement of water or have a moderately fine to fine texture. These soils have a slow rate of water transmission.

Table 5: Erodability Ratings Based on K and Slope (From Washington DNR Watershed Analysis Handbook (Version 2.1)

Slope Class (Percent)	K < 0.25 Not easily detached	0.25 < K > 0.40 Moderately detachable	K > 0.40 Easily detached
< 30	Low	Low	Moderate
30 - 65	Low	High	High
>65	Moderate	High	High

Slopes in areas to be treated are less than 30 percent. Using this rating method, Bellpine is considered moderately detachable due to a K factor of 0.28 for the surface soil. Dupee is ranked as easily detachable due to a K factor of 0.37. K factors are used by Natural Resource Conservation Service (NRCS) to estimate the potential erosion off of exposed agricultural fields. These factors would be substantially less for the Orchard because of the fact that all fields have 100% ground cover, greatly reducing the possibility of soil detachment.

c. Impacts of the Alternatives on Soils

There may be concern that repeated insecticide use could lead to a buildup of pesticide residues in the soil. Table 6 shows the behavior of the proposed pesticides in the soil.

Table 6: Breakdown Behavior of Pesticides

Pesticides	Solubility in Water	Persistence in Soil	Leaching Potential	Volatility	Major Degradation Mechanism
Esfenvalerate	Low	Moderate	Negligible	Low	Biological and Chemical

Solubility: *High* - greater than 100 ppm; *Moderate* - 1 to 100 ppm; *Low* - less than 1 ppm.
Persistence: *High* - Half life greater than 180 days; *Moderate* - Half life of 30 - 180 days; *Low* - Half life of less than 30 days.
Volatility: *High* - vapor pressure greater than 1.00 mm of Mercury; *Moderate* - Vapor pressure - 1.0 x 10 mm of Mercury; *Low* - Vapor pressure less than 1.0 x 10 mm of Mercury.

Chemical pesticides primarily break down in the soil and water in two ways: chemically and biologically. Chemical breakdown depends on several factors including pH, temperature, soil minerals, light, moisture, and organic matter content. When pesticides are broken down by the soil itself the process is usually chemical. Chemical degradation of pesticides in soil can occur when the pesticide composition is unstable at higher pH and temperatures. If soils are alkaline and contain low organic matter content, hydrolysis may be the primary reaction. Bellpine and Dupee are both moderately to strongly acid with surface soil pH that ranges from 5.1 to 6.0. Soil composition also affects the ability of a pesticide to be absorbed into the soil particles or adsorbed to the outside of the soil particle. A high organic matter content lessens the amount of pesticide broken down by hydrolysis. Average organic matter content in the surface horizon for the Bellpine series is 3 to 6 percent; and 2 to 3 percent for Dupee.

When the breakdown is done by organisms in the soil, there are several ways the

breakdown can occur. In microorganisms, e.g., bacteria, fungi, and some algae, hydrolysis appears to be the major process through which pesticide compounds are broken down to nontoxic products. This action is governed by various enzymes contained within the organisms. Enzymes allow the microorganisms to metabolize the pesticides. These organisms take the chemicals needed for life, such as phosphorus and carbon, and leave the other usually harmless chemicals.

In all breakdown methods, the persistence of the pesticide in the environment is often given a value expressed in half-life. The half-life of a pesticide is the number of days it would take for half of the residue to break down. In the case of pesticides, this value may be a half-life of hours or days. While the chemical may still provide residual pesticidal effects during this time period, the original amount is being reduced and degraded by the methods described above.

Pesticides not broken down can leach out of the soil. The leaching ability of a pesticide is affected by the moisture content, permeability, and absorption or adsorption power of the soil.

In general, the pesticides proposed for use break down fairly quickly and therefore do not accumulate in the soil.

i. **Proposed Action (Aerial Application of Esfenvalerate):** No ground disturbing activities are proposed, therefore no effects to soil properties, processes, or long term productivity are anticipated. Esfenvalerate binds to organic matter in the soil and is not very mobile. It remains unchanged in the soil for varying lengths of time, depending on soil texture and organic matter content. The half-life of esfenvalerate can range from 29.4 to 108 days. It is broken down by soil microorganisms and by photodegradation. Breakdown of esfenvalerate in soil yields carbon dioxide as a major final product. In general, breakdown in the environment produces compounds which are less toxic than esfenvalerate. It is practically insoluble in water and the potential for leaching is low.

   A comprehensive review of the literature (Hill, 1985) has determined that synthetic pyrethroids at recommended field rates will not adversely affect earthworm populations. The pyrethroids permethrin, fenvalerate, and fenpropathrin were classified as "poor molluscicides", indicating no or negligible activity to the terrestrial slugs, *Helix aspersa* and *Arion ater*. Effects of pyrethroids on microorganisms has been shown only at concentrations "grossly in excess" of normal field conditions. Similar insensitivity to pyrethroids were shown in bacteria, algae and actinomycetes.

   The Proposed Action would have little to no short or long term detrimental effects on the soil resource.

ii. **Alternative A (Esfenvalerate Application using Ground-Based Equipment):** Impacts would be similar to (or less than) those described for aerial application since a lesser amount of esfenvalerate would be used with ground treatment.

iii. Alternative B (No Action): The No Action alternative would not affect soil resources.

2. Water

a. Climate - The climate affecting Orchard water resources is primarily influenced by the Pacific Ocean. The area generally experiences cool wet winters and warm dry summers. Rainfall is light during the summer and follows frequent Pacific storm patterns during the late fall and winter periods. Weather station data from Cottage Grove (roughly 12 miles east, 650 feet elevation) indicates that for 29 years of record there is an average of 46 inches of precipitation with approximately 77% of the total precipitation occurring from October though March. The proposed pesticide application period is April through early May. April and May average 1-2 days per month where precipitation exceeds 0.5 inches.

The elevation at the Orchard ranges from 800 to 1200 feet above sea level. Although snow can fall at the Orchard during winter cold fronts, this elevation is considered below the transient snow zone. The average annual snowfall in Cottage Grove is 6.7 inches. The average monthly temperatures for April is 49° F.

b. Groundwater - Limited information concerning the ground water aquifer below the Orchard is available. General geologic maps of the area (United States Geologic Survey 1991) indicate the dominate underlying geology is composed of the middle Eocene Tyee Formation. The Tyee Formation is composed of fine to medium grained marine sandstone and carbonaceous siltstone. Oregon Water Resource Department (OWRD) (Oregon Water Resource Department 1999) well log data indicated that there are 33 domestic wells in sections adjacent to the Orchard. The static water depths range from 0 to 288 feet. Some of the wells are located in different surface drainage basins or upstream of the Orchard. There is one domestic well within the Orchard. It has a static water level of 87.5 feet and a yield of 2.5 gallons per minute. Information depicting groundwater quality was not available.

c. Surface Water –Upper Siuslaw Watershed
The Orchard is located within the Siuslaw River (1710020601) fifth field watershed, located in the Mid-Coast Sub-Basin. The Orchard contains ephemeral, intermittent, and perennial streams, some swale features, and one grassed waterway. Wetlands within the Orchard are generally associated with the groundwater system adjacent to the stream channels.

Mid to long term discharge records are not available for either the Siuslaw River in the vicinity of the Orchard or its tributaries. A United Stated Geologic Survey (USGS) gaging station (14307620), located in the Siuslaw River near Mapleton, Oregon, approximately 35 miles west and downstream of the Orchard, provides an indication of the relative timing and amount of streamflow. Table 7 illustrates the statistical summary of 20 years of records (adapted from United States Geologic Survey, 1990). These values reflect the rainfall precipitation patterns.

Table 7: Statistical summarys of Precipitation at Cottage Grove and Runoff Patterns from the Siuslaw River near Mapleton, Oregon (14307620) .

Month	Mean Monthly Precipitation (inches)	Annual Runoff (%)	Mean Runoff Per Sq. Mile* (cfs/sq. mile)
October	3.60	1.8	0.76
November	7.46	9.7	4.29
December	7.20	20.9	8.95
January	6.53	19.8	8.50
February	5.20	17.0	8.01
March	5.38	14.0	6.00
April	3.53	8.1	3.60
May	2.53	4.1	1.76
June	1.39	2.2	0.96
July	0.53	1.1	0.46
August	0.95	0.6	0.27
September	1.65	0.7	0.34

* derived from mean monthly flows

Hydrologic and riparian information pertaining to the surface waters that are immediately adjacent to, flowing through, or initiating from the Orchard and a surface stream map can be found in the Project Analysis File. This information is pertinent to susceptibility and risk of water pollution from pesticide application and was used in the Risk Assessment.

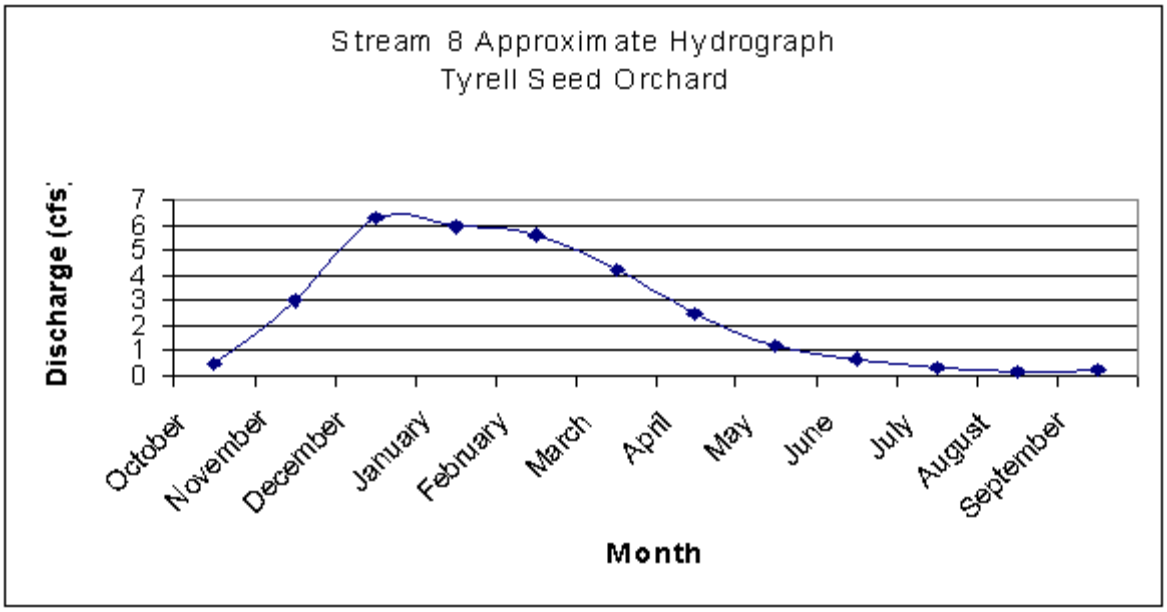
An Oregon Department of Environmental Quality (OEQ) water quality assessment (Oregon Department of Environmental Quality, 1988a) describes the water quality conditions in the larger channels downstream from the Orchard. The report identifies the Siuslaw River as having, by observation, moderate water quality problems of nutrients, sediment, and erosion. The OEQ 303(d) List (Oregon Department of Environmental Quality,1998b) includes the Siuslaw River from the mouth to headwaters as water quality limited for summer temperature. The list also includes the lower segment of the South Fork Siuslaw confluence located 2 miles upstream of the Orchard, for impaired biological criteria. The 303(d) list indicates those waterbodies which do not currently meet all applicable water quality standards necessary to protect beneficial uses. Existing and potential beneficial uses listed in Oregon Administrative Rules (chapter 340, rule 340-041-0245) for the Siuslaw Basin include: industrial and domestic water supplies, irrigation, livestock watering, anadromous fish passage, salmonid fish rearing, salmonid fish spawning, resident fish and aquatic life, wildlife and hunting, fishing, boating, water contact recreation, aesthetic quality, and hydropower. Irrigation represents the majority of the recorded beneficial uses for water rights recorded in the vicinity of the Orchard. The state water quality parameter most likely to be affected by introduction of pesticides to water would be the toxic concentrations. The most likely beneficial uses to be affected would be resident fish and aquatic life.

d. Surface Water – Seed Orchard Project Area

The Noti and Swisshome/Mapleton orchards are located in a watershed drained by

Stream 8, a second order tributary of the Siuslaw River. Stream 8 has a watershed area of 450 acres. Figure 6 depicts the approximate hydrograph for Stream 8. A stream gauge was installed at bridge 3 along the Old Growth interpretive trail in December 2001. Stream 8 is separated from both proposed spray units by a buffer of at least 200 feet. This buffer consists of conifers and heavy brush.

Figure 6: Noti Orchard Unit Hydrologic Features



Stream 54 borders the southwest end of the Noti unit. It is a perennial stream located approximately 50 feet from the orchard edge and over 200 feet from the edge of the proposed treatment area. The south and southeast portion of the orchard is composed of a grassy depression that was modified during orchard construction. This grassed area, which functions as a grass waterway, transports water from an adjacent road drain during large storm events. The grass waterway is not surface connected to Stream 54. Water pools at the orchard edge and infiltrates into the soil. There is no evidence of orchard runoff being captured and transported by this channel. The area is not expected to contain water during the application period.

The Swisshome/Mapleton unit does not contain any stream channels. Swales 52 and 53 are swale features which have no evidence of surface flow. Swale 51 contains water during typical wet seasons. The water pools next to a gravel road , drains through a culvert under the road, and infiltrates into the forest floor. It is not connected, via the surface, to the Stream 8 channel network. Northeast of the unit is a small shallow pond.

e. Impacts of the Alternatives on Hydrology

In the Risk Assessment, runoff and leaching was assessed using the Groundwater Loading Effects of Agricultural Management Systems (GLEAMS) and the Method of Characteristics (MOC) models. The GLEAMS model, developed by the USDA

Agricultural Research Service, is a computerized mathematical model developed for field-sized areas to evaluate the movement and degradation of chemicals within the plant root zone under various crop management systems. The model has been validated using a variety of data. The MOC model, developed by the USGS, was used to account for attenuation effects of the buffer zone. MOC is a two dimensional groundwater flow and chemical transport model and computer changes in concentration over time accounting of the processes of dispersion, adsorption, and degradation.

Aerial Drift was modeled in the Risk Assessment using AgDRIFT, a cooperative model developed by the EPA Office of Research, the USDA Agricultural Research Service, the USDA Forest Service, and the Spray Drift Task Force.

Stream 8 is the only fish bearing stream that could be effected by application of Asana XL®. GLEAMS modeling demonstrates that esfenvalerate from the spray units would most likely to reach the channel network only under storm conditions. Stream 54 and Swales 51, 52, and 53 are the upper reaches of the channel network where esfenvalerate could enter the flowing water of Stream 8; however, Swales 51, 52, and 53 would be either dry or would not surface connect to the rest of the channel network during application, so risk from drift entering flowing water would be minimal to absent.

i. Proposed Action (Aerial Application of Esfenvalerate)

Esfenvalerate has a high adsorption rate and is nearly insoluble in water and binds with soil and organic matter. As a result, the primary mechanisms for esfenvalerate to enter surface water are aerial drift into a stream channel and the mobilization of contaminated sediments into the channel network.

Typical values of known Asana XL® chemical ingredients from drift are listed in Table 8. These values were taken from the Risk Assessment and are from the modeling of more acres than are being considered for this treatment (therefore numbers are conservative). Stream concentrations resulting from drift would occur in the spring immediately after application. Due to a combination of mitigation measures including buffers, heavy vegetation in the buffers, and no stream crossings in the flight pattern, very little Asana XL® ingredients are expected to reach the stream network or concentrate in Stream 8 via drift.

Table 8. Stream Concentrations of Asana XL® Components Under the Proposed Action resulting from Drift (Stream 8).

Chemical	Stream Concentration (mg/l)
Esfenvalerate	7.58×10^{-8}
Ethylbenzene	9.02×10^{-9}
Xylene	6.38×10^{-8}

Mobility of Asana XL® from orchard units is limited by the absence of overland flow sufficient to detach soil particles and transport both soil particles or organic matter. Table 9 depicts predicted instream concentrations of Asana XL® ingredients. GLEAMS modeling reveals the most likely scenario of runoff contamination to be in response to storm events occurring the winter following application. Due to a combination of mitigation measures, including sediment retention structures in swales, aeration of the downslope field perimeters, and buffers, very little Asana XL® ingredients are expected to reach the channel network and concentrate in Stream 8. No Asana XL® ingredients are expected to move into groundwater.

Table 9. Stream Concentrations of Asana XL® Components Under the Proposed Action resulting from Runoff and Erosion (Stream 8).

Chemical	Stream Concentration (mg/l)
Esfenvalerate	1.49×10^{-7}
Ethylbenzene	7.66×10^{-10}
Xylene	-0-

ii. Alternative A (Esfenvalerate Application using Ground-Based Equipment):

Esfenvalerate has a high adsorption rate and is nearly insoluble in water and binds with soil and organic matter. As a result, the primary mechanisms for esfenvalerate to enter surface water are aerial drift into a stream channel and the mobilization of contaminates sediments into the channel network.

Typical values of known Asana XL® chemical ingredients from drift are listed in Table 10. These values were taken from the Risk Assessment and are from the modeling of more acres than are being considered for this treatment (therefore numbers are conservative). Stream concentrations resulting form drift would occur in the spring immediately after application. Due to a combination of mitigation measures including buffers, heavy vegetation in the buffers, and no stream crossings in the flight pattern, very little Asana XL® ingredients are expected to reach the stream network or concentrate in Stream 8 via drift.

Table 10. Stream Concentrations of Asana XL® Components Under Alternative A resulting from Drift (Stream 8).

Chemical	Stream Concentration (mg/l)
Esfenvalerate	1.25×10^{-6}
Ethylbenzene	1.49×10^{-7}
Xylene	4.48×10^{-7}

Mobility of Asana XL® from orchard units is limited by the absence of overland flow sufficient to detach soil particles and transport both soil particles or organic matter. Table 11 depicts predicted instream concentrations of Asana XL ingredients. GLEAMS modeling reveals the most likely scenario of runoff contamination to be in response to storm events occurring the winter following application. Due to a combination of mitigation measures, including sediment retention structures in swales, aeration of the downslope field perimeters, and buffers, very little Asana XL® ingredients are expected to reach the channel network and concentrate in Stream 8. No Asana XL® ingredients are expected to move into groundwater.

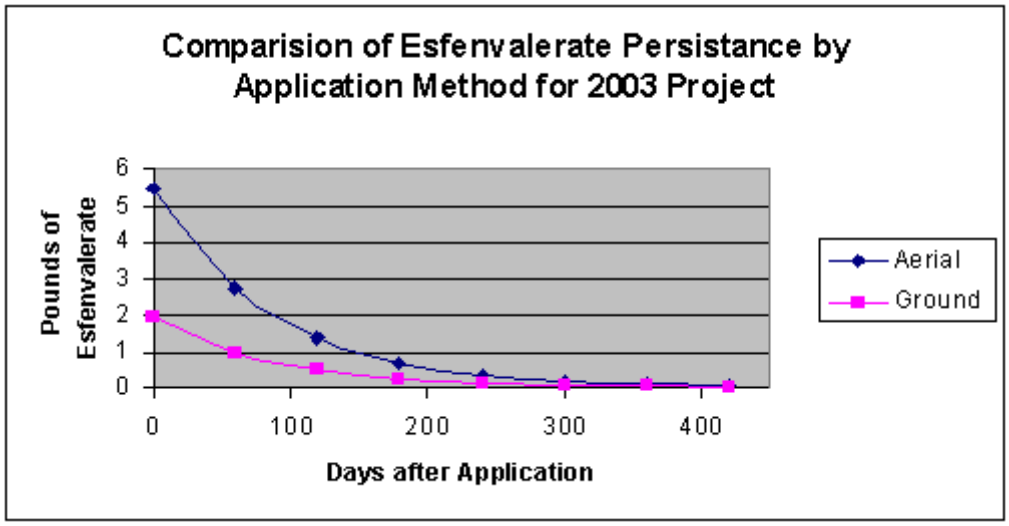
Table 11. Stream Concentrations of Asana XL® Components Under Alternative A resulting from Runoff and Erosion (Stream 8).

Chemical	Stream Concentration (mg/l)
Esfenvalerate	3.91×10^{-8}
Ethylbenzene	-0-
Xylene	-0-

Alternative A (ground-based spraying) presents a higher exposure risk to water resources than does the proposed alterative because the application period would be 27 hours over approximately a 6 to 8 day period instead of 1 hour. The longer application period results in a higher likelihood of unfavorable weather conditions, equipment error, operator error, and a longer duration of aquatic resources exposure to drift contamination.

Figure 7 compares the persistence of esfenvalerate on the spray units by application method. Since the proposed application rate for aerial application (0.19 lbs./ac.) is higher than ground application (0.057 lbs./ac.), there is 3.3 times the esfenvalerate mass throughout the degradation period. Esfenvalerate applied

Figure 7. Esfenvalerate Persistence by Application Method



aerially will also persist longer since there is more of it to begin with.**iii. Alternative B (No Action):** The No Action alternative would not affect water resources.

E. THE BIOLOGICAL ENVIRONMENT

1. Fisheries

The Orchard is located in the Douglas Creek 6th Field, Upper Siuslaw 5th Field, and Siuslaw River 4th Field watersheds. The Siuslaw River does not flow through the Orchard but comes within 1/4 mile at the southeast corner of the Orchard. Douglas Creek and two tributaries, one referred to in this document as Stream 8, flow through and out of the Orchard. The following species have been recorded from the Siuslaw River and tributaries in the project area:

Steelhead (*Oncorhynchus mykiss*)
Cutthroat trout (*Oncorhynchus clarki*)
Sculpin (*Cottus spp*)
Coarse scale sucker (*Catostomus macrocheilus*)
Dace (*Rhinichthys spp*)
Redside shiner (*Richardsonius balteatus*)
Chinook salmon (*Oncorhynchus tshawytscha*)
Coho salmon (*Oncorhynchus kisutch*)
Pacific lamprey (*Lampetra tridentatus*)
Western brook lamprey (*Lampetra richardsoni*)

Coho salmon are listed by the National Marine Fisheries Service as threatened under the Endangered Species Act.

While Douglas Creek is separated from the spray areas by a low ridge and is not expected to be directly influenced by the proposed spray activity, its conditions are much better documented than the conditions of Stream 8 that adjoins the spray unit. Since the general background conditions for Douglas Creek and Stream 8 are similar, a summary of information on Douglas Creek is included to provide general indication of the condition of streams in the spray area.

Slopes and stream gradients in Douglas Creek and other tributaries are mostly moderate, with little canyon development or channel incisions. The drainage courses within the Orchard perimeter were not developed for orchard units. They were cleared of forested cover, planted with evergreen tree species other than Douglas-fir, and allowed to revegetate with shrubs and small trees such as vine maple, Himalayan blackberry, evergreen blackberry, scotch broom, and salal. This is a dense, often impenetrable, area that supports a variety of smaller wildlife species. These "non-usable" areas dissect both production orchard sections and make up about 32% of the land base (248 acres) inside the fenced perimeter. Streams have been buffered with vegetation in the Orchard, although upper parts of some minor draws have only brush and ground cover at and near the channels.

Douglas Creek arises on the low hills marking the eastern slopes of the Coast Range Mountains. Douglas Creek is used by cutthroat trout, coho salmon, steelhead, sculpin,

sucker, lamprey and redside shiner. Access into Douglas Creek was improved by replacement of the road culvert by the Oregon Department of Fish and Wildlife in 1999. While Douglas Creek flows through the Orchard, it is approximately 1/4 mile from the proposed spray area and is separated by a low ridge.

A second Siuslaw River tributary, in the southwest portion of Section 15 and northeast portion of Section 21, indicated as Stream 8 on the map, was observed at a few locations downstream from the project area to near the Siuslaw River Road in Section 21. Coho salmon, cutthroat trout and sculpin were found in the stream. Coho were documented in July, 2002, in Stream 8 at a trail crossing below Road 20-5-16 and could be up as high as just below the culvert on this road. This is approximately 500 feet below the proposed spray area. The lower end of a fork farther upstream near the Wells Creek unit was also netted; no fish were found.

In the Orchard (Section 15 above Road 20-5-10), larger trees near the stream have been removed, but there is a well-developed brush layer. The channel is confined and bordered by low sloping hills. Fish habitat types in the lower reaches are pools, riffles, and glides. Substrates include silt, sand, gravel, rubble, and bedrock. Moderate amounts of wood debris and logs are in the channel. Riparian vegetation contains large conifers, second growth conifers, brush and hardwoods.

Stream 8 crosses the Siuslaw flood plain on private land, where landowners have built two small ponds that are connected to the tributary. Between the Orchard and the flood plain, Stream 8 passes through a confined canyon, with well-developed forests on each side.

Seining was done in another Siuslaw tributary (Stream 1) in the vicinity east of the Tyee 2 but within Section 15, NE 1/4. Cutthroat trout and sculpin inhabit this stream adjacent to the Orchard. The pools and riffles contain silt, gravel and sand. High numbers of logs and moderate amounts of wood debris are in the channel. Part of the stream is within a bog area. Riparian vegetation includes hardwoods, brush and second growth conifers. The Siuslaw River Road culvert is a barrier to upstream migration of fish. The lower part of this Siuslaw tributary also was observed below the Siuslaw River Road where sculpin were the only fish found, although habitat would appear suitable for cutthroat and coho. The habitat includes glides, pools, and riffles which contain high silt, sand, and low gravel. Moderate amounts of wood debris and low numbers of logs were in the streambed.

Macro invertebrates at streams in the general area include crayfish, aquatic snails, mayflies, stoneflies, caddisflies, water striders, dragonflies, mosquitos, and others.

There are a few places within the fenced Orchard perimeter where road construction has crossed a drainage and the culvert has created a small pond upstream. There are at least three such sites totaling about 0.8 acre. These hold water most of the time as evidenced by the obligate wetland plant species such as cattail (*Typha* spp.) growing around them. These sites are suitable as breeding pools for amphibians. Rough skinned newt (*Taricha granulosa*) males in breeding condition were observed in one pool. Aquatic invertebrates are also present in these sites.

Impacts of the Alternatives on Fisheries

a. Proposed Action (Aerial Application of Esfenvalerate): Esfenvalerate is highly toxic to fish. Table 12, derived from Risk Assessment data, depicts the toxicity of esfenvalerate to aquatic species. There is very little toxicological data available specifically for esfenvalerate and coho salmon. However, there have been toxicity studies done with fenvalerate. Since the active isomer in fenvalerate is esfenvalerate, the mechanism of action is identical and the toxicological symptoms will be the same. In the absence of fenvalerate or esfenvalerate data, other pyrethroids were used to estimate toxicity levels.

Table 12. Toxicity of Esfenvalerate to Aquatic Species

Species	LC_{50} (mg/L)	Reference
Rainbow trout	0.00026 (96-hr)	Du Pont 1999
Rainbow trout	0.076 (24-hr)	Coats and O'Donnell-Jeffery 1979
Steelhead trout, juvenile	0.000088 (96-hr. intermittent, mean) 0.000172 (96-hr continuous)	Curtis et al. 1985
Atlantic salmon	0.0000012 (96-hr)	McLeese et al. 1980
Bluegill sunfish	0.00026 (96-hr)	Du Pont 1999
Bluegill sunfish	0.00031 (96-hr)	Fairchild et al. 1982
Common carp	0.0001 (96-hr)	Extoxnet 2000

In the Risk Assessment, steelhead trout were used to represent coho salmon. Steelhead, the anadromous form of the rainbow trout, and coho salmon are both found in Douglas Creek. Juveniles, and recently deposited eggs of both species may be present at the time of proposed spraying, but only steelhead adults would be present. While the esfenvalerate is not classified as teratogenic, the potential for toxic impacts would be highest for the eggs. Coho and steelhead are genetically both in the genus Onchorhynchus and are adapted to similar habitat. Both have similar life histories, with spawning occurring in the winter-spring, one to two years in freshwater, and one to three years in the ocean before returning to spawn. The principle difference is that coho die after spawning and steelhead return alive to the ocean and may return to spawn again. Cutthroat are the most likely to be close to the proposed areas of application.

A comparative study between coho salmon and steelhead trout showed that both species were similarly affected by five pyrethroids, with the steelhead being slightly more sensitive (and thus, using steelhead data may provide a slight margin of safety) [Mauck, W.L. et al. 1976]. In the absence of specific tests, it is assumed that the impacts on coho would be similar to those of steelhead. This assumption was made in the Risk Assessment, where the risks from esfenvalerate to coho salmon were derived by using LC50 data from juvenile steelhead trout.

The sensitivity of fish to pyrethroids, compared with other vertebrates, has been explained, in part, by the fishes' inability to metabolize and excrete the compounds

(Haya 1989). Sublethal effects on fish include abnormal swimming, a reduced startle response, loss of equilibrium, body tremors, altered metabolic processes, growth, and depressed olfactory function. Moore and Waring (2001) investigated the sublethal effects of a pyrethroid (cypermethrin) on the olfactory system of Atlantic salmon (*Salmo salar*). Atlantic salmon exposed from 0.000004 to 0.00001 mg/L cypermethrin for 5 days showed a decrease in olfactory sensitivity and a decrease in olfactory-mediated biochemical responses to a reproductive pheromone.

Esfenvalerate is considered highly toxic to aquatic invertebrates. Its presence in the water has the potential to reduce available food supplies for fish and other aquatic organisms; however, any reduction in the aquatic invertebrate population is likely to be transitory. Spray entering the water via accidental drift or spill may cause initial mortality as the esfenvalerate travels downstream, but any concentrations are not expected to linger. Re-colonization from upstream population would restore the community within a period of 4-6 weeks.

Estimated risk can be used by applying the Quotient Method (United States Environmental Protection Agency 1986). Using this method, the ratio of estimated exposure concentration (EEC) to the exposure level expected to have an adverse effect (LC50) provides the risk estimate. The quotient (Q) is assessed as follows:

$Q < 0.1$ = No adverse effects
$0.1 < Q < 10$ = Possible adverse effects
$Q > 10$ = Probable adverse effects

Based on a 1980 agreement between EPA/OPP, The Department of the Interior, The Office of Endangered Species, The Department of Commerce, and the National Marine Fisheries Service, the quotient method was modified for use with endangered aquatic species. Under this agreement, there is a presumption of unacceptable risk when the EEC is greater than 1/20th of the LC50. Therefore, a Q value greater than 0.05 is presumed to be an unacceptable risk.

The Risk Assessment calculated the Q value for the risk of esfenvalerate to coho salmon to be 0.000424 for aerial application. This Q value is at least 2 orders of magnitude less than the 0.05 permitted using the EPA Quotient Method as modified for Endangered Species. It is expected an exposure period would be associated with a storm event where surface runoff from an application unit is able to connect with part of the channel network.

Sublethal affects on Coho salmon from the Proposed Action application are expected to be well below even the most sensitive levels found. Moore and Waring (2001) studied the sublethal effects of a pyrethroid on salmon and found that male parr exhibited an inhibited olfactory response to concentrations of less than 4 parts per trillion. Modeling values calculated in the Risk Assessment for aerial application (Q = 0.000424) showed the expected pyrethroid concentration in water would be 108 times less than the 4 parts per trillion found in the Moore and Waring study.

Based on the GLEAMS modeling completed for the Risk Assessment and the proposed mitigation measures, the potential for esfenvalerate to enter the streams near the project area is very low and, if it occurs, would probably be from a spill rather than

spray activity. Because there is a limited capacity for groundwater or overland flow to transport esfenvalerate to where fish are present, contamination sufficient to cause toxic effects is improbable.

Ethylbenzene and xylene, the two inerts on EPA list 2, are moderately toxic to fish. Toxic signs of xylene included rapid, violent and erratic swimming, coughing, loss of equilibrium and death (Morrow et al. 1975). Limited information is available regarding chronic exposure of aquatic organisms to ethylbenzene and xylenes. Because of rapid volatilization from water to the atmosphere, chronic exposure in water is unlikely.

The potential of ethylbenzene and xylenes to bioaccumulate in fish is low. Elimination from aquatic organisms appears to be rapid. Biomagnification through the food chain is unlikely. On the basis of their rapid volatilization and degradation, and their low to moderate toxicity, the overall risk to the aquatic environment can therefore be considered low (Environmental Health Criteria, 1996 and 1997).

No new roads, no ground-disturbing activities and no vegetation changes would be part of the Proposed Action. The action involves spraying for insect pests in established orchards with established access. Impacts would be limited to the action of the insecticide to be sprayed. Proposed guidelines are designed to limit the affect of the spray to the immediate orchard or individuals trees to be treated and to limit drift. Guidelines are designed to prevent spray from reaching the aquatic system. One anticipated impact would be a decrease in non-target terrestrial insects, including some that are beneficial. No group of species other than the insects is expected to be impacted by the Proposed Action.

Even though potential for esfenvalerate to enter the stream is low, the National Marine Fisheries Service will probably make a determination of May Affect, Likely to Adversely Affect, due to its toxicity. For a more detailed discussion of the effects of esfenvalerate on fisheries, see Biological Assessment in the project analysis file.

b. Alternative A (Esfenvalerate Application using Ground-Based Equipment): All information specific to esfenvalerate, mitigation measures, and National Marine Fisheries determination described in the Proposed Alternative are applicable to Alternative A. The Risk Assessment value for ground-based application (Q = 0.000111) was determined to be less than that for aerial application; therefore, anticipated impacts are expected to be less than described for the Proposed Alternative.

c. Alternative B (No Action): The No Action alternative would have no effect on fisheries resources.

2. Wildlife

Wildlife species that occupy the Orchard during all or part of their life cycle are those adapted to early successional environments and are tolerant of disturbance. However, the proximity of older more complex habitats adjacent to the Orchard also influences the number and kind of wildlife that use it. The adjacent habitats consist of mid-to-late successional forests, commercial clearcuts, and forested riparian habitat. The 160 birds,

13 amphibians, 8 reptiles, and 57 mammals that occur around the Orchard or use the Orchard are listed in the Project Analysis File.

As a result of the Orchard's managed condition, the vegetative communities are simple in composition and structure. Much of the vertical structure is absent from the communities within the Orchard boundary and the grassland species composition is primarily non-native and reduced in number. The most complex habitat within the fenced perimeter is the uncultivated draws between orchard units. These sites have been cleared of most of the trees and have grown back into dense shrubby tangles. Interspersed with the orchard units, these patches serve as hiding and nesting cover for many birds and mammals that use the orchard units for foraging habitat. The orchard units supply excellent open hunting perch sites, an abundance of vulnerable insects, good small mammal populations, and good grass seed production to attract foraging animals.

Six habitats were identified in Sections 9, 15, and 21 within the Orchard jurisdiction and are shown in Table 13.

Table 13: Habitats within the Orchard Jurisdiction

Habitat	Total Acres	Acres (Inside Fence Only)
Douglas-fir Forest (older than 30 years)	294.0	0.0
Douglas-fir Orchard (younger than 15 years)	350.0	350.0
Grassland	132.0	132.0
Ponded Water	0.8	0.8
Shrubby Riparian	262.0	247.0
Woody Riparian	63.0	20.0

The eight-foot high welded wire perimeter fence surrounding the orchard units serve as a partial to complete barrier for many wildlife species. Deer and elk are completely excluded from the Orchard and only occasional sightings of black bear and mountain lion in the Orchard have been documented (G. Miller personal communication 1999). Habitats outside the Orchard fence are managed Douglas-fir forests stands in various age classes ranging from seedling to late-successional (> 80 years old).

a. Habitat Descriptions

i. **Douglas-fir forest:** All of the older Douglas-fir forest habitat existing within Sections 9 and 15 is outside of the perimeter fence. Douglas-fir stands are located in the south and east sides of Section 15 (139 acres) and the west side of Section 9 (133 acres). These stands are second growth timber around 50 years old except for about 47 acres of older trees (>80 years old) in Section 9. These older stands are more diverse than the younger ones and support several tree species other than Douglas-fir (western red cedar, incense cedar, western hemlock, and Pacific yew). This diversity creates a greater complexity of habitats for a variety of wildlife.

These species tend to be relatively specific to the use of these older habitats and are not often found within the Orchard itself.

ii. **Douglas-fir orchard:** About 350 acres of the Orchard (45% of land base) currently supports cultivated conifers maintained for their seed. Improved Douglas-fir trees are grown on all but about 20 acres where mixed conifer species are raised. This habitat is very simple and consists of evenly spaced conifers less than 15 years old with an understory of non-native grasses such as fescues, orchard grass, and velvet grass. This understory is kept simple by management practices such as mowing, tilling, and weeding.

A few species subsist within the Orchard unit boundaries. Most of these species are small mammals including long-tailed vole (*Microtus longicaudus*), western pocket gopher (*Thomomys mazama*), and California ground squirrel (*Spermophilus beecheyi*), but also include grassland birds such as western meadowlarks and vesper sparrows. Several species use the orchard units for foraging, some of the most common of which are western bluebird, white-crowned sparrow, violet-green swallow, yellow-rumped warbler, American goldfinch, great-horned owl, and red-tailed hawk.

iii. **Grasslands:** There are approximately 132 acres of non-native open grasslands adjacent to the orchard units within the fence perimeter. These areas are unplanted units that will be used in for possible implementation of second generation orchards. Currently the same non-native grass mix that is underneath the seed trees is planted on these acres. Some species that use grassland habitats use these sites; however, the lack of a well developed forb component and the limited number of grass species also limits the number of wildlife species that exploit this habitat. Species that do take advantage of these areas include savannah sparrow, western meadowlark, vesper sparrow, long-tailed vole, western pocket gopher, and California ground squirrel.

iv. **Ponded Water:** There are a few places within the fence perimeter where road construction has crossed a drainage and the culvert has created a small pond upstream. There are at least three such sites totaling about 0.8 acre. These hold water most of the time as evidenced by the obligate wetland plant species such as cattail (*Typha* spp.) growing around them. These sites are suitable as breeding pools for amphibians. Rough skinned newt (*Taricha granulosa*) males in breeding condition were observed in one pool. Aquatic invertebrates are also present in these sites.

v. **Shrubby Riparian:** The drainage courses within the Orchard perimeter were not developed for orchard units. They were cleared of forested cover and allowed to revegetate with shrubs and small trees such as vine maple, Himalayan blackberry, evergreen blackberry, scotch broom, and salal. This is a dense, often impenetrable, area that supports a variety of smaller wildlife species. Many species of insectivorous birds were observed perching within the shrubby riparian patches and "hawking" insects over the orchard units. These "non-usable" areas dissect both production orchard sections and make up about 32% of the land base

(248 acres) inside the fenced perimeter.

vi. **Woody Riparian:** Most of this type of habitat (36 acres) occurs outside of the Orchard fence and is located in the southeastern corner of Section 9. This is the part of Douglas Creek that flows through this section and consists of larger older second-growth conifer trees intermingled with hardwoods. It is structurally consistent with habitat that can support species that require shaded coniferous riparian conditions. The smaller slivers of woody riparian habitat within the fenced perimeter have only remnant or small trees along the drainage channels. These areas were cleared during the construction of the Orchard and are primarily occupied by shrubs. They do not resemble the more mature patches along Douglas Creek outside of the fence.

b. Individual Species of Interest

There are several species of special interest that occur or could occur within the Eugene District. The Project Analysis File displays the entire list and their potential for occurring in or near the Orchard. The narrative below describes only the Threatened and Endangered species that may occur within the vicinity of the Orchard. No RMP designations (e.g., Survey and Manage, Bureau Tracking, or Bureau Assessment) pertain within the Orchard.

Bald Eagle (Status: threatened) - The bald eagle requires large trees or cliffs for nesting. In western Oregon, nests are constructed in large dominant trees about one-quarter the length from the top. Nests are usually in line-of-sight of a major water body. There are no bald eagle nests documented within the area of the Orchard. There is some possibility that bald eagle activity could occur along the Siuslaw River; however, the Orchard itself does not provide bald eagle habitat.

Northern Spotted Owl (Status: threatened) - Spotted owls rely on older seral stages for nesting and foraging. These birds nest in trees large enough to provide a cavity or platform that can hold a nest and young. Douglas-fir reach this size in the Coast Range at about 80 years old. Also at this age forested stands begin to develop snags and coarse woody debris that provide suitable habitat for the owls' prey species.

Suitable habitat for spotted owls exists within the late successional forest remnants located in the southwest quarter of Section 15 as well as in Section 11 northeast of Section 15, and Section 14 just east of Section 15. There is no suitable habitat for spotted owls within the fenced perimeter of the Orchard.

Marbled Murrelet (Status: threatened) - In Oregon these birds nest in mature or old-growth forests as far as 50 miles from the coast. Within the Eugene District most murrelet nesting activity occurs within 35 miles of the sea. The Orchard falls within the 35 mile to 50 mile distance--at the outer perimeter of the nesting range for this area. Since 1990, the Eugene District has performed seven, 2-year surveys for murrelets. Six stations were placed in potential habitat in Sections 3 and 5 just to the north of the Orchard. No murrelets have been detected. Potential habitat for murrelets is not found within the fence perimeter of the Orchard itself.

Fender's blue butterfly (Status: Proposed endangered) - This species is located within the Willamette Valley. Larvae of this species are limited to lupines and in this area it is using Kincaid's Lupine, *Lupinus sulphereous* var. *kincaidii*, where available and the Spurred Lupine, *Lupinus laxiflorus*, as an alternate host. Currently, it is known from only four areas within the Eugene District, all of which are located in the Willamette Valley and adjacent foothills. It is unlikely that the Fender's Blue would occur as far into the Coast Range as the Orchard nor does the host plant occur there.

c. Impacts of the Alternatives on Wildlife

i. Proposed Alternative (Aerial Application of Esfenvalerate):

Issue 1: How does this insecticide affect non-target species including pollinators and insect predators?

Application of esfenvalerate may have an adverse affect on insect predators and non-target insect species including pollinators. According to the Pesticide Fact Sheet, esfenvalerate is highly toxic to bees (USDA Forest Service 1995b). Oregon State University (1996) found that esfenvalerate can interrupt pollination by killing bees and effectively repelling bees from the sprayed area for up to two days after application. Toxicity is related only to direct spray and esfenvalerate is not expected to be toxic to bees after drying. In addition, if esfenvalerate temporarily reduces the population of non-target insects in and around the orchards, the food supply for nesting insectivorous birds would also decline. They would have to forage elsewhere until the insect population has recovered. Because of esfenvalerate's short duration of toxicity to insects and the relatively small area that would be sprayed, this would not be expected to result in any reduction in vigor or productivity in these bird species.

Fifty-four species of birds and mammals that inhabit the Orchard could experience both direct (contact with spray) and/or indirect (consuming sprayed material--plant or animal) exposure to the chemical. Esfenvalerate is considered moderately toxic to mammals (USDA Forest Service 1995a), and test results regarding toxicity to birds varies from slightly to moderately toxic (Oregon State University 1996 and USDA Forest Service 1995b). As a precaution, bird boxes in the proposed spray units would be removed by March 1. Because this would be a one time application, the level of exposure would be acute and would be expected to be far below the toxic threshold. In addition, there would be little potential for chronic exposure to wildlife. The remote exception to this may be that according to the USDA (1995b) there is evidence that esfenvalerate may bioaccumulate in the tissues of fish and other aquatic organisms. Birds and mammals that prey on these species could have chronic indirect exposure to esfenvalerate through consuming tainted prey, but laboratory studies show that low chronic exposure does not have significant adverse affects on laboratory rabbits or rats (USDA Forest Service 1995b). Also, proper spray procedures would ensure that the chemical would not contaminate any wet areas, streams, or open water where these species reside.

In addition, while esfenvalerate is highly toxic to fish and aquatic invertebrates (USDA Forest Service 1995b), there is no information regarding this chemical's affect on amphibians and reptiles. The possibility that these species are sensitive to this chemical exists and it is possible that direct exposure of resident amphibians and reptiles (red-legged frog, rough-skinned newt, and northwestern garter snake) within the treated unit boundaries could occur. There is the potential of some direct mortality to individuals of these species within the immediate spray zone if this chemical is highly toxic to them as well.

Issue 3: How will this insecticide application affect northern spotted owl foraging and dispersal habitat?

The one time application of this insecticide within the Orchard perimeter would have no affect of any kind on habitat for the northern spotted owl. Because northern spotted owls generally hunt rodents under the forest canopy or in small forest openings, the likelihood of exposure of spotted owls to this chemical either directly (contact with the chemical after spraying) or indirectly (consumption of prey that were exposed) would be remote. No adverse effect on the owl population is anticipated.

ii. Alternative A (Esfenvalerate Application using Ground-Based Equipment):

Evaluation of Esfenvalerate would be the same as for the Proposed Action.

iii. Alternative B (No Action):

Issue 1: How does this insecticide affect non-target species including pollinators and insect predators?

Insecticide would not be applied in this alternative, therefore, there would be no affect on non-target insect species and their predators.

Issue 3: How will this insecticide application affect northern spotted owl foraging and dispersal habitat?

Insecticide would not be applied in this alternative, therefore, there would be no affect on northern spotted owl foraging and dispersal habitat.

3. BOTANY

During August 1999, a plant survey was conducted at the Orchard (T.20S, R.5W, Sec. 9, 15 & 21). The survey area included the Orchard (120 acres), an area 20 feet around the exterior deer fence surrounding the Orchard, eight miles of deer fence (40 acres), and 270 acres of shrubby riparian area. The survey was made using the controlled-intuitive method and a random species inventory of the production, breeding, and preservation orchards.

A total of 287 species were documented (a species list is contained in the project file): 131 species were found adjacent to the Orchard, 39 species were found along riparian areas, 112 species were found in the Orchard units, and 5 noxious weed species were found in disturbed areas. There are no threatened, endangered, special status, or rare plants known to exist within the Swisshome/Mapleton and Noti units at the Orchard.

Special status plants are defined as Bureau Sensitive plants and Bureau Assessment plants. The Oregon Natural Heritage Program (ONHP) (2001) ranks rare and sensitive plants in four lists. List 1 plants are Bureau Sensitive and List 2 plants are Bureau Assessment. The species found in the orchard, the fence line, and the shrubby riparian area are discussed below. Common names are used, while scientific names can be found at http://plants.usda.gov.

a. **Orchards** - To control soil-borne pathogens, the orchard was scalped to a depth of sixteen inches, thereby removing the native species. Typical disturbed-site exotic grass and herbaceous species dominate: annual bromes, tall and red fescue, bentgrasses, orchard grasses, wild carrot, stork's bill, daisy, etc. (see species list in project file). Frequent mowing inhibits noxious weed species such as Canada thistle, bull thistle, Scotch broom, Klamath weed, and stinking willie from the Orchard area proper. However, mowing may contribute to spread of noxious and exotic species along fence and shrub area boundaries. Occasionally, Canada and bull thistles, tansy, or goat weed grow in the small tree trunk wells that are not mowed.

b. **Fence line** - A deer fence surrounds the three orchard areas and traverses all habitats from dry ridge lines to riparian bottoms. Those areas where the fence parallels a boundary with private property mostly have young Douglas-fir plantations outside the fence. The BLM property outside of the fence ranges from a young ponderosa pine plantation to remnant old-growth/mixed-aged forest. The fence line survey area is mowed or brushed at varied times during the year. Some of the common native herbaceous species found along the fence line include birdfoot deervetch, spreadfruit goldenbanner, fireweed, western pearly everlasting, and roughleaf aster, along with salal, Oregon grape, oceanspray, vine maple, buckbrush, snowberry, and others. Exotic plants such as Scotch broom, blackberry, thistle, tansy, and goat weed are present along the fence line at varying densities. South of the office buildings the fence runs through a stand of approximately 45-year-old Douglas-fir, with a mostly closed canopy. Typical plants here include common whipplea, woodsorrel, wildginger, calamint, Columbian lily, bedstraw, and others.

c. **Shrubby Riparian** - Shrub areas in the Orchard have been reforested with tree species that will not contaminate the Douglas-fir pollen flow. These reforested species include sugar pine, western white pine, Pacific silver fir, giant sequoia, Jeffrey pine, and Port-Orford-cedar. These trees are seldom or never found in native habitats on the Eugene District. Other blocks have been planted to noble fir, grand fir, hemlock, ponderosa pine, and western red-cedar. Shrub species' composition is typical of young plantations and is very dense. Exotic plants such as Scotch broom and blackberry are sometimes established along the edges of the shrub areas, but rarely penetrate far into the interior. There are some stands of the native grasses such as Columbia brome and blue wildrye in more protected edge areas. There are some pockets of older trees, especially at the south end of Section 15 along Stream 8. A few beavers are active in the main riparian areas in both the east and west orchards. The most diverse (and most accessible) marsh area is above the main road in Section 9. Plants found here include floating pondweed, narrowleaf bur-reed, American eelgrass, twoheaded water-starwort, tapertip rush, common rush, swordleaf rush, pointed rush,

tinker's penny, muskflower, and others. Other smaller impoundments below and in the Section 15 stream corridor are similar but with far fewer aquatic and wetland species. Other smaller boggy areas have cattails or dense stands of panicled bulrush and fowl mannagrass. There is some reed canary grass and blackberry scattered along the stream bottoms. Large portions of the creek bottoms and side draws are over-grown with impenetrable barriers of brush and large woody debris.

d. Impact of the Alternatives on Botany

i. Proposed Action (Aerial Application of Esfenvalerate) and Alternative A (Application of Esfenvalerate using Ground-Based Equipment): The main concern with insecticide use from a botanical perspective is the potential short term or cumulative destruction of insect pollinators that may negatively impact sensitive and rare plant species' viability. Risk of serious impact to plant populations increases with several factors, such as obligate out-crossing needs, extreme pollinator specificity in the plant, a short pollination window, or a closed, difficult pollination mechanism (Stevens and Burgess, pers. comm. 1995).

A thorough botanical survey detected no special status plant species within the Orchard fenced boundary. Special status plants are defined as Bureau Sensitive plants and Bureau Assessment plants. The Oregon Natural Heritage Program (2001) ranks rare and sensitive plants in four lists. List 1 plants are Bureau Sensitive and List 2 plants are Bureau Assessment.

There are no special status plants known within, adjacent, or outside of the Orchard. Surveys have not been conducted outside and at a distance from the Orchard as the areas are privately owned. The nearest special status plant population known to the BLM are two sites of tall bugbane (*Cimicifuga elata*), each within about one mile from the Orchard. Tall bugbane is a Bureau Sensitive (ONHP List 1) species, meaning that taxa are threatened with extinction or presumed to be extinct throughout their entire range. At this distance, localized, one-time pollinator impacts are unlikely to reduce long-term population viability. However, the issue bears analysis because tall bugbane is pollinated by bumblebees and syrphid flies. Loss of pollinators is listed as a potential threat in the conservation strategy for tall bugbane (USDA et al. 1996).

Esfenvalerate, an insecticide proposed in this EA, is highly toxic to bees (Dupont de Nemours 1989, Kidd and James 1991). Bees and other plant pollinators that come in contact with the spray while it is in the air or any time before it has dried on surfaces will likely be killed. Thus, pollinator reduction is a concern. However, several factors reduce the likelihood of serious risk to the tall bugbane populations mentioned above:

- The distance (approximately a mile away, in two directions) reduces the chance that pollinators for these plants would be killed (especially bumblebees, who often do not forage more than several hundred yards).
- The plants have a long period of pollination, and an open pollinator mechanism, so pollination success is not believed to be "limiting" for this species. There is

some evidence that they can successfully self-pollinate at least some of the time.

- Both the Proposed Action and Alternative A propose a single application in April-May, which is outside the window of pollination for tall bugbane, and unlikely to lead to cumulative effects.
- Mitigation measures provided in both the Action alternatives parallel those specified for the Dorena Tree Improvement pesticide project and approved by the United States Fish and Wildlife Service (1995, 1996) through formal technical assistance on (then) Federal Candidate plant species wayside aster (*Aster vialis*) (BLM correspondence 1995, 1996). These measures include monitoring of spray detection cards, directing spray toward the center of the project area, conducting spray operations during lower temperatures, and mowing prior to application should monitoring by a botanist or wildlife biologist indicate that plants are flowering prior to spraying.

ii. Alternative B (No Action): The No Action alternative presents none of the risks mentioned above in regard to pollinator species.

V. CONSULTATION AND COORDINATION

A. Public Participation:

A public notice advertising the availability of this EA and preliminary FONSI will be published in the Eugene Register-Guard on October 9, 2002. Additionally, the environmental assessment will be sent to 20 groups or businesses, eight government agencies, and 26 individuals. A 30-day public comment period for the EA closes on November 8, 2002.

B. Agencies, Groups, and Individuals Consulted

Consultation with the National Marine Fisheries Service will be completed prior to a decision on this project.

C. List of Preparers

The Proposed Action and alternatives were developed and analyzed by the following interdisciplinary team of BLM specialists:

Carla Alford	Wildlife and Threatened and Endangered Species
Mary D'Aversa	Hydrology
Neil Armantrout	Fisheries
Nancy Brian	Botany
Rudy Wiedenbeck	Soils
Glenn Miller	Seed Orchard Manager
Michael Crawford	Forester (Author)

VI. FIGURES

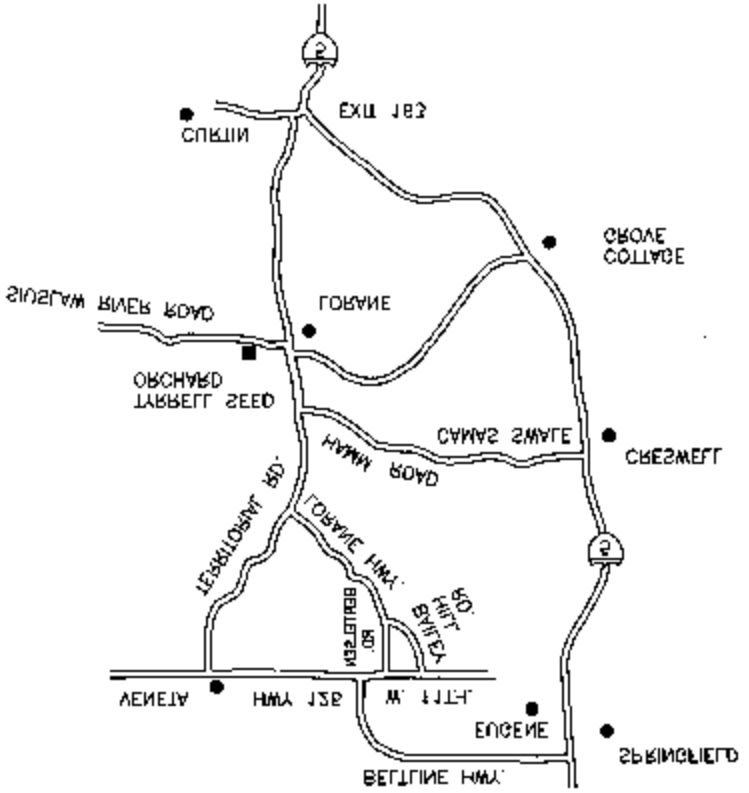
This section contains figures referred to throughout the document. The following figures are included:

Figure 1	Travis Tyrrell Seed Orchard Vicinity Map
Figure 2	Detailed Proposed Treatment Area Map
Figure 3	Proposed Treatment Area Photo - Swisshome/Mapleton Seed Production Orchard
Figure 4	Proposed Treatment Area Photo - Noti Seed Production Orchard
Figure 5	Helispot/Insecticide Mixing Areas

Figure 1: TRAVIS TYRRELL SEED ORCHARD VICINITY MAP

U.S. Department of the Interior
Bureau of Land Management
Eugene District
Travis Tyrrell Seed Orchard
26350 Siuslaw River Road
P.O. Box 121
Lorane, Oregon 97451

Telephone: (541) 683-6445
FAX: (541) 683-6597



From Eugene: Take West 11th and turn south on Bertelsen (which turns into Bailey Hill Road and then Lorane Highway) and proceed 12.5 miles. Turn left on Territorial Road and continue for 6 miles to Lorane. Turn right onto Siuslaw Road and travel 3 miles to Orchard, which is on the right.

From I-5 North: Turn off I-5 at Creswell Exit 182 and turn right. Travel west 10.5 miles through Creswell to Camas Swale Road, which turns into Hamm Road. Turn left on Territorial Road and continue 5.5 miles to Lorane. Turn right onto Siuslaw Road and travel 3 miles to Orchard, which is on the right.

From I-5 South: Turn off I-5 at Curtin Exit 163. Turn right and travel 1 mile. Turn right at Lorane sign and go 9 miles to Lorane. Turn left onto Siuslaw Road and travel 3 miles to Orchard, which is on the right.

From Cottage Grove: Proceed west on Main Street. This will turn into Cottage Grove-Lorane Highway. Go 12.5 miles. Turn left in Lorane onto Territorial Road. After approximately 300 feet turn right onto Siuslaw Road and go 3 miles to the Orchard, which is on the right.

Figure 2 : DETAILED PROPOSED AREA MAP

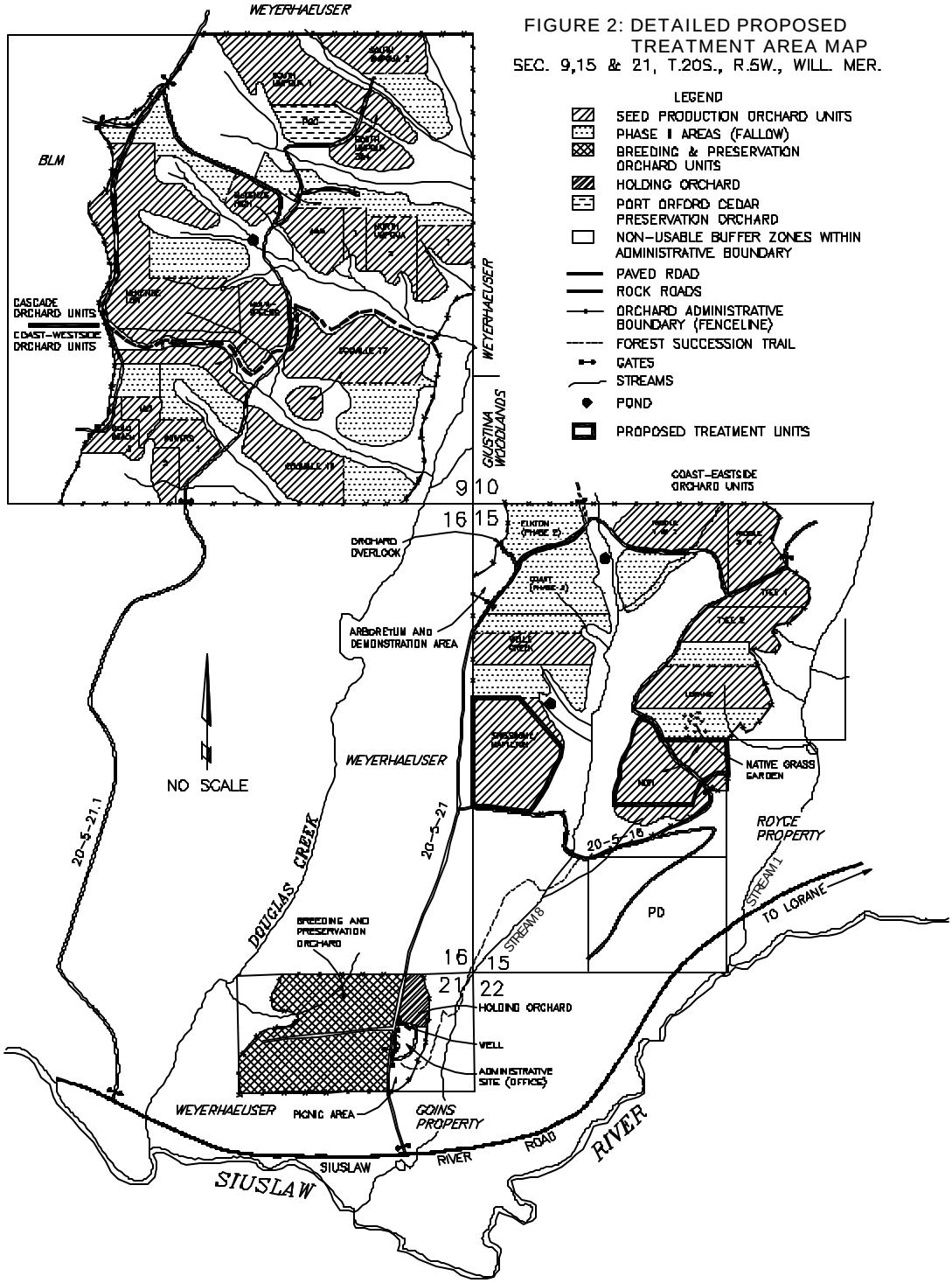


Figure 3 - DETAILED TREATMENT AREA MAP
Swisshome/Mapleton Seed Production Orchard
2003 Pesticide Treatment Area (17 Acres)

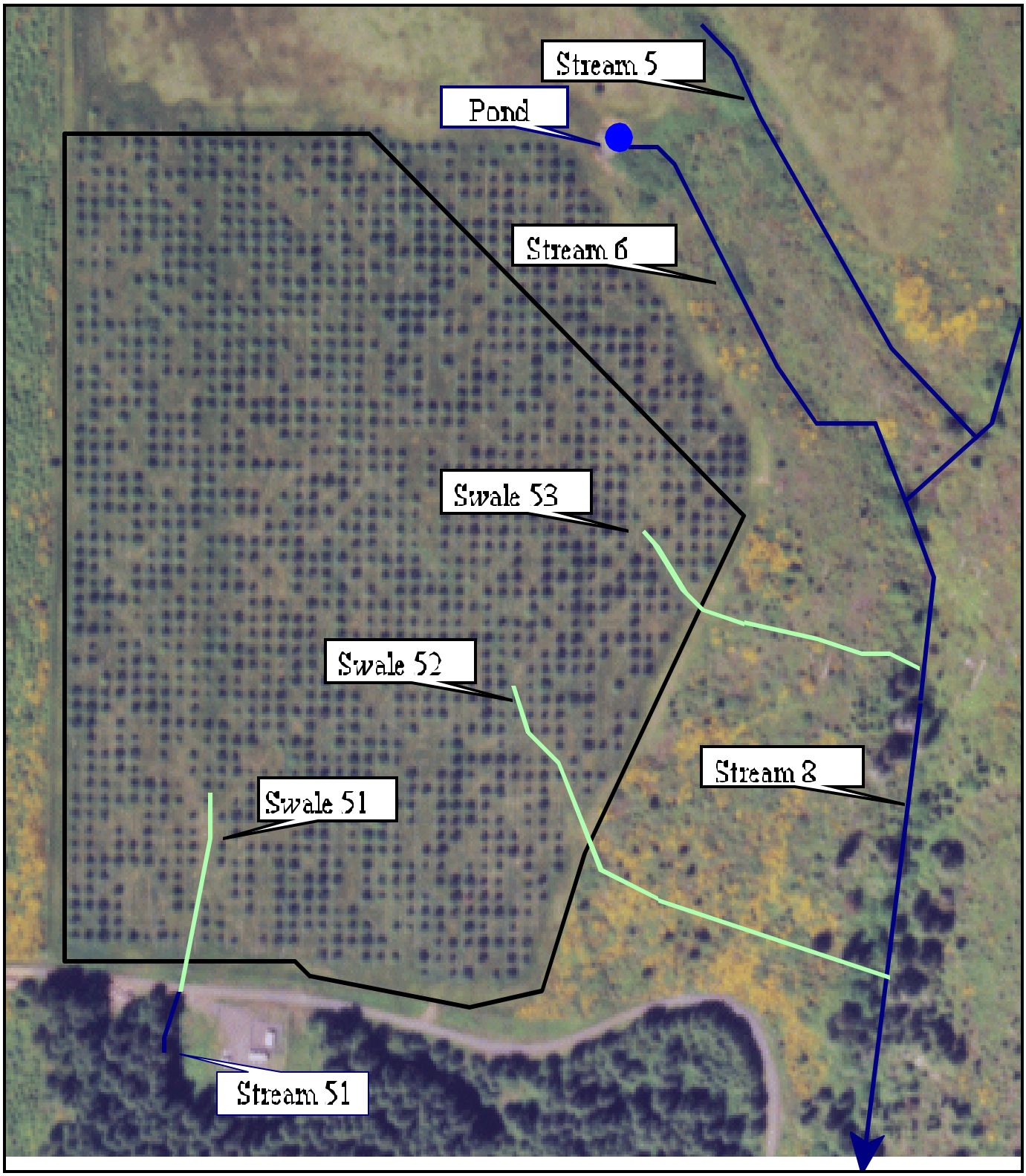


Figure 4 - DETAILED TREATMENT AREA MAP
Noti Seed Production Orchard
2003 Pesticide Treatment Area (12 Acres)

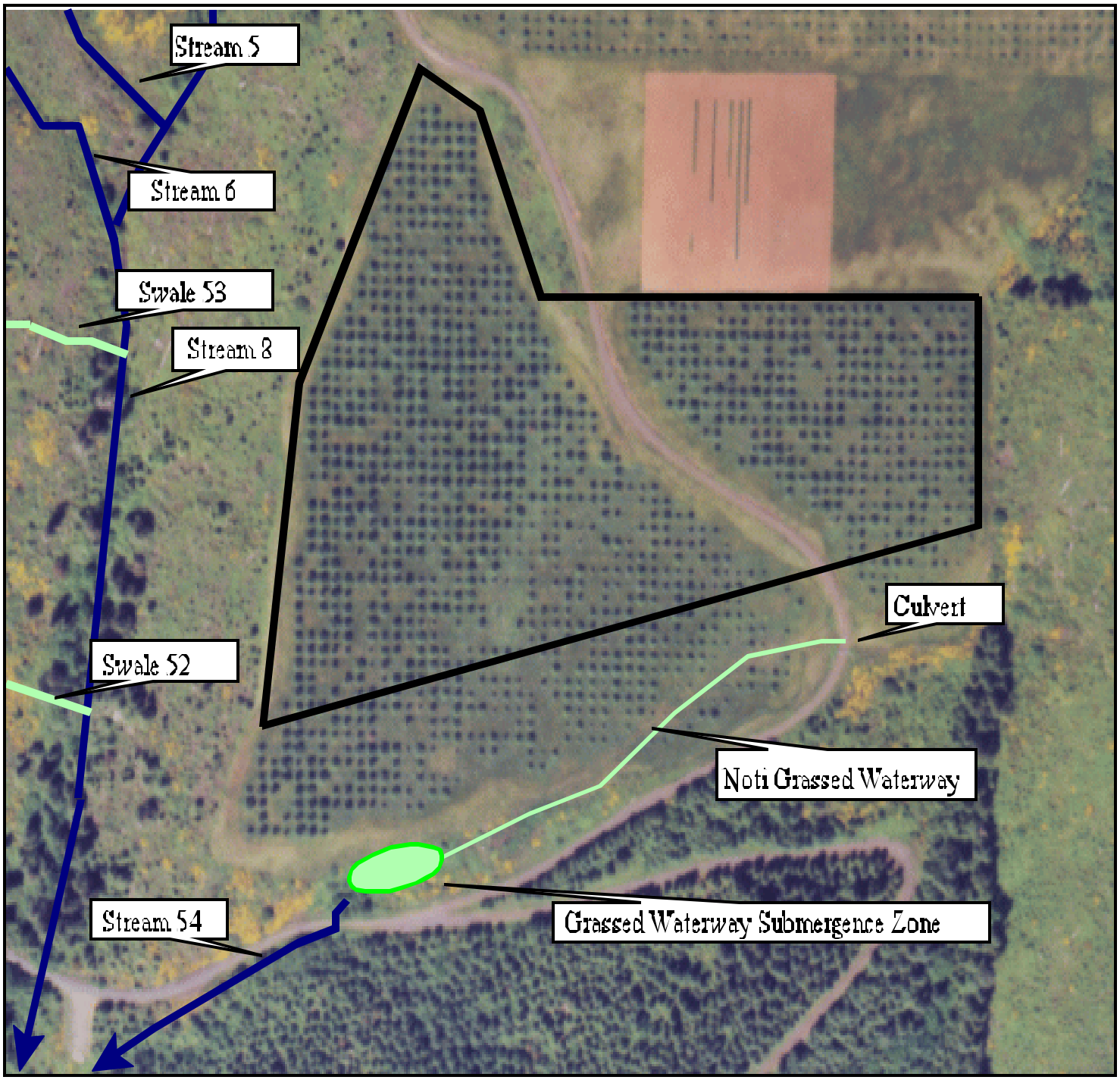
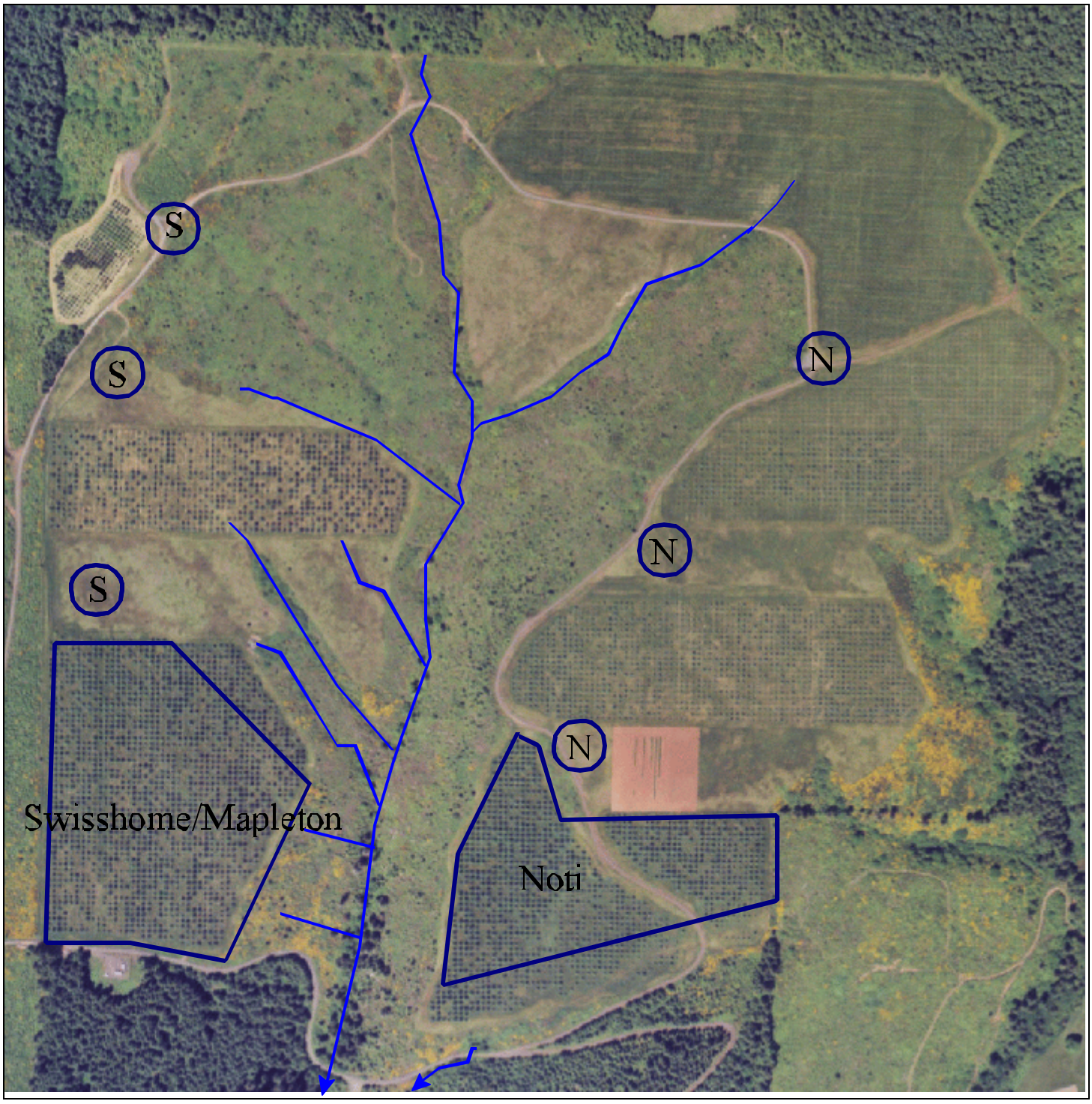


Figure 5 - HELISPOT/INSECTICIDE MIXING AREAS
2003 Pesticide Treatment

S Potential Helispot/Mixing Areas for Swisshome/Mapleton

N Potential Helispot/Mixing Areas for Noti



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9011A
EA-02-15

PRELIMINARY
FINDING OF NO SIGNIFICANT IMPACT
for

Travis Tyrrell Seed Orchard Insect Control
Environmental Assessment No. EA-02-15

United States Department of the Interior
Bureau of Land Management
Oregon State Office
Eugene District

The Eugene District of the Bureau of Land Management (BLM) has analyzed a proposal for insect control at the Travis Tyrell Seed Orchard in an environmental assessment (EA OR090-02-15). The Tyrrell Seed Orchard is a centralized tree seed orchard designed to provide genetically improved Douglas-fir seed for BLM's Coos Bay, Roseburg and Eugene districts and for ten private timber and seed companies. Protecting cone crops from insect damage is necessary in order to meet the seed need for the BLM and private cooperators. The purpose of the action is to control cone insects which cause damage and seed loss to orchard cone crops. There is a need for control of cone insects in two seed production units (29 acres) in the spring of 2003. The EA considered a Proposed Action (Application of Esfenvalerate Insecticide by Aerial (Helicopter) Equipment), Alternative A (Application of Esfenvalerate Insecticide by use of Ground-Based Equipment), and the No Action Alternative.

A summary of the environmental effects (as discussed in the EA) follows:

- The Proposed Action would have no significant impacts on social and economic environment in the region or the locality (EA, pp. 9-10).
- The EA analysis concludes that the application and mitigation measures would insure that the Proposed Action would have a negligible effect on public health and safety (EA, pp. 6-7, 11-13)
- There are no unique characteristics, such as prime or unique farmlands or wild and scenic rivers within the project area (EA, p. 9).
- Impacts on the quality of the human environment would not be highly controversial.
- There are no highly uncertain, unique, or unknown risks involved.
- The Proposed Action would involve application only in 2003 and would not establish any precedent for future action (EA, p. 3-4).
- The EA analysis considered cumulative impacts and did not identify any that might be significant (EA, pp. 11-13, 14-16, 19-23, 25-28, 32-33, 35-36).
- There are no known cultural resources within the project area (EA, p. 9).
- In a biological opinion prepared by the National Marine Fisheries Service (NMFS) pursuant to

section 7 of the Endangered Species Act, NMFS concluded that the Proposed Action May Affect, Likely to Adversely Affect Oregon Coast coho salmon or destroy or adversely modify critical habitat. The EA analysis showed that the potential for environmental problems occurring with the Proposed Action was minimal. The EA analysis also concluded that the Proposed Action would have no effect on any other threatened or endangered species (EA, pp. 31-33, 35-36).

- This action has no adverse energy impact, as outlined in the President's National Energy Policy (Executive Order 13212).

- The Proposed Action would not violate Federal, State, and local law requirements imposed for protection of the environment.

Determination:

On the basis of the information contained in the EA, and all other information available to me, it is my determination that implementation of the Proposed Action would not have significant environmental impacts not already addressed in the *Eugene District Proposed Resource Management Plan/Environmental Impact Statement* (November 1994), and the *Eugene District Record of Decision and Resource Management Plan* (June 1995), with which this EA is in conformance, and does not, in and of itself, constitute a major federal action having a significant effect on the human environment. Therefore, an EIS or a supplement to the existing EIS is not necessary and will not be prepared.

Approved by: _____ _____
Julia Dougan Date
Eugene District Manager